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The Impact of the Economic Crisis on Civil Employment in the South-West Oltenia Region of Romania

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Abstract

This paper investigates the impact of the economic crisis on civil employment at the regional level in Romania, especially in the South-Western region of Oltenia. The aim of this study is to test whether the decreasing number of the employed population in the south-western Oltenia region is mainly due to the economic crisis or other factors. The proposed theory is that the decline of civil employment is the consequence of several specific factors (culture, habits, traditions, the dominant religion, applied restructuring policies), as well as political decisions at the central and regional level. The results confirm our theory. In its first part, this paper focuses on the comparative analysis of particularities regarding the evolution of the average number of employees, across macro-regions and development regions of Romania, with emphasis on the years 2008 and 2013 (i.e. before and after the outbreak of the economic crisis). The second part of the paper highlights important changes specific to each economic branch (in terms of civil employment) across South-West Oltenia region in the period under review.

Keywords: civil employment; development region; activity of national economy; South-West Oltenia; Romania

1. Introduction

The impact of the global economic crisis manifested itself differently from country to country and even from one internal region to another. This heterogeneity was determined by factors such as: the state of the economy at the beginning of the crisis, the structural characteristics of the economy and labour market policies (Aiginger, Horvath, Mahringer, 2011).

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The restructuring processes that occurred after the fall of Communism and the economic crisis of late 2008 have had major implications on the labour market after both events interrupted the economic growth in nearly all EU member states and even worldwide. Some Romanian authors (Roman & Voicu, 2010, Pociovălişteanu, 2011) have highlighted many problems encountered in the Romanian labour market, in particular migration and its negative social consequences, as it results in a temporary abandonment of minors by their labour migrant parents and these children are left in the care of other relatives which leads to some of these children dropping out of school, high unemployment and low internal mobility.

Other authors (Arpinte, Cace & Cojocaru, 2010) consider that the low levels of employment, relatively high unemployment and, within it, a high proportion of long-term unemployment can be explained by low school attendance and lower educational stock. The costs of switching jobs as well as the probability of finding another job depend on individual human capital characteristics, such as the age and education of the individuals, as well as on regional and economic conditions, such as the degree of urbanisation and local employment conditions (Tocco, Davidova & Bailey, 2014.)

These negative phenomena determined by the decreasing number of workplaces have strong implications for the disadvantaged regions and counties. On the other hand, the regional economic structure is one of the main determinants of employment growth (Combes, 2000). This idea is supported by other authors as well (Bieri, 2012), who highlight the role of industry concentration, employment specialization and sectorial diversity in shaping the urban economic development process.

The counties comprised in the South-West Oltenia Region share a large percentage of the active population occupied in agriculture (Zaharia & Bălăcescu, 2012). This region and the West Region are the least affected by the economic crisis in terms of unemployment (Lazăr & Lazăr, 2013).

Starting from the data series *Average number of employees at the territorial level* and *Civil employment by macro region, development region, county and national-economy activities* (NIS, 2015), this paper analyses both the evolution of the average number of employees, prior and subsequent to the economic crisis, as well as the extent to which the specificity of problems faced by the region and its counties have influenced these developments.

2. Research methodology

Several reports on the impact of the economic crisis were conducted in accordance with the Nomenclature of Territorial Units for Statistics. These studies were correlated with specific factors at levels where analyses had been achieved and organized by regional level (NTUS) and the Statistical Classification of Economic Activities in the European Community (Regulation (EC) No 176/2008). Three hypotheses were tested:

- the significance of macro-specific factors on the evolution of the number of employees;
- factors specific to the counties in the *South-West Oltenia* development region significantly influenced the evolution of the number of employees during the period under review;
- the economic crisis led to significant changes in the structure of civil employment in *South-West Oltenia* development region by national-economy activities.

In order to analyze how the variation values recorded in counties or macro regions influence the total variance, ANOVA (Analysis of Variance) was used. The analysis of variance is "the analysis in the outcomes of an experiment to assess the contribution of each variable to the total variation" (Karris, 2007). Whereas Y is the resultant variable and $X = (x1, x2, \ldots, x_n)$ the vector of the factorial variables, the ANOVA method emphasizes the influence of the group factors $(x_i, i=1,n)$ on the resultant variable. Given that, within this paper, the registered values are grouped either only according to the counties or only according to macro regions, $n=1$, the ANOVA Single Factor method was used. Noting with r the number of groups, and with n_i the number of samples in each group, the hypotheses are:

$$\begin{aligned} &H_0 : \mu_1 = \mu_2 = \cdots = \mu_r \\ &H_1 : \quad \exists\, i, j \in \{1,2,\ldots,r\}, i \neq j, \text{so that } \mu_i \neq \mu_j \end{aligned} \tag{1}$$

For successfully applying ANOVA method, there should be determined:

- The average of each group ($\bar{y}_i, i=\overline{1,r}$) and the general average ($\bar{y}_0$):

$$\bar{y}_i = \frac{\sum_{j=1}^{n_i} y_{ij}}{n_i}, \quad \bar{y}_0 = \frac{\sum_{i=1}^{r} \bar{y}_i \cdot n_i}{\sum_{i=1}^{r} n_i} \tag{2}$$

– The sum of the square between groups (S_1), the sum of the square within groups (S_2) and the total sum of the square (S_0):

$$S_1 = \sum_{i=1}^{r} \left(\bar{y}_i - \bar{y}_0\right)^2 \cdot n_i, \quad S_2 = \sum_{i=1}^{r} \sum_{j=1}^{n_i} \left(y_{ij} - \bar{y}_i\right)^2, \quad S_0 = \sum_{i=1}^{r} \sum_{j=1}^{n_i} \left(y_{ij} - \bar{y}_0\right)^2 \tag{3}$$

– The variance between groups (S_1^2), and the variance within groups (S_2^2)

$$S_1^2 = \frac{S_1}{df_1} = \frac{\sum_{i=1}^{r} \left(\bar{y}_i - \bar{y}_0\right)^2 \cdot n_i}{n-r}, \quad S_2^2 = \frac{S_2}{df_2} = \frac{\sum_{i=1}^{r} \sum_{j=1}^{n_i} \left(y_{ij} - \bar{y}_i\right)^2}{n-r} \tag{4}$$

The null hypothesis is tested with the statistical test F, for the ratio of two variances:

$$F = \frac{s_1^2}{s_2^2} \sim F_{n_1-1, n_2-1} \tag{5}$$

Testing these hypotheses regarding the impact the national economy had on change in the civil-employment structure in the *South-West Oltenia* development region was performed with t-Test; Two-Sample Assuming Unequal Variances. In this case, the test statistic (t_Stat) is:

$$t\_Stat = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}, \text{where} \quad s_i^2 = \frac{\sum_{j=1}^{n_i} \left(x_{ij} - \bar{x}_i\right)^2}{n_i - 1}, i = \overline{1,2} \tag{6}$$

In (6), n_1 and n_2 are the number of elements in each sample, where $\bar{x}_i, i = \overline{1,2}$ represent their averages.

The significance level used was $\alpha = 0.05$. The types of software used for processing this series of data were Excel and SPSS.

3. Results and discussions

3.1. Evolution of the number of employees on macro regions, 2003-2013

In terms of annual average number of employees, the period from 2003-2013 was characterized by different evolutions. The completion of the great economic restructuring processes which dominated this century's first decade led to reductions in the number of employees –in 2004, a minimum was recorded in three out of Romania's four macro regions. That year, the average number of employees ranged between 867 thousand in Macro 4 (*South-West Oltenia* and *West Oltenia* development regions) and 1332 thousand employees in Macro 3 (*Southern Muntenia* and *Bucureşti-Ilfov* development regions). In Macro 2 (North-East and South East development regions) the reduction in the number of employees continued until 2004, recording a minimum of 1109 thousand employees (Fig.1).

The period 2004 - 2008 was characterized by economic growth, a fact which favoured increasing the number of workplaces in all four macro-regions. The growth was quite linear, as the model shown in Table 1 demonstrates. Given the values Sign_F (which are much lower than the significance level) the hypothesis of linearity is accepted, both at the level of each macro-region, as well as at a national level in Romania. Consequently, in the pre-crisis period, the number of employees in Romania increased annually, with a value ranging between 102.78 and 193.21 thousand persons.

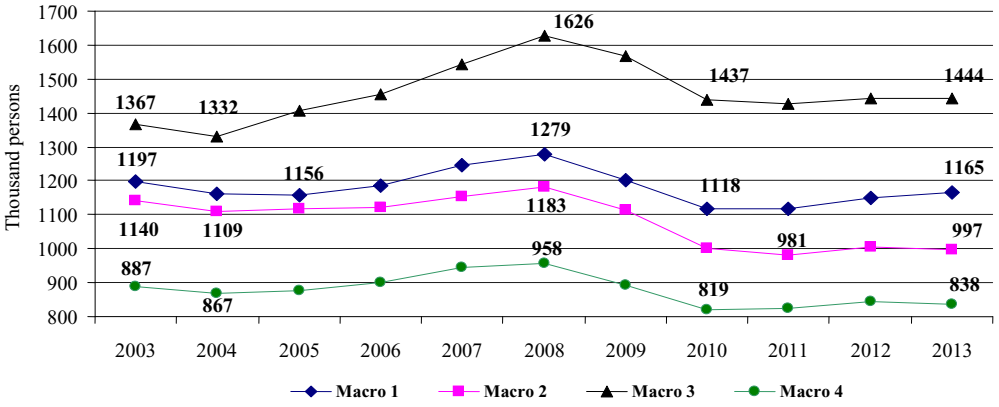

Fig. 1. Evolution of the average number of employees, in Romania during the period 2003-2013. Source: authors' data processing based on NIS data base

The highest annual rise was recorded in Macro 3 (between 60.32 and 84.36 thousand persons), the Bucureşti-Ilfov development region; the lowest average annual rise, with values ranging between 7.38 and 29.41 thousand persons, was recorded in Macro 2 (North-East and South East development region).

	Multiple R	*F*	*Sign_F*	*B*	*T_Stat*	*P_value*	*Lower 95%*	*Upper 95%*
Total	0.9864	108.49	0.0018	148.0	10.495	0.0018	102.78	193.21
Macro 1	0.9471	26.17	0.0144	32.5	5.119	0.0144	12.28	52.71
Macro 2	0.9507	28.24	0.0130	18.4	5.314	0.0130	7.38	29.41
Macro 3	0.9959	363.76	0.0003	72.3	19.072	0.0003	60.23	84.36
Macro 4	0.9808	75.99	0.0031	24.8	8.71	0.0031	15.74	33.85

Table 1. Characteristics of changes in the distributions parameters regarding the active population with upper secondary and post-secondary non-tertiary education in the period 2005-2014. Source: authors' data processing.

The outbreak of the economic crisis interrupted the growth process, and in less than two years led to significant reductions in employment in all four macro regions. At the national level, the number of employees decreased in Romania by 13.27%. Macro 3 was the least affected region, where the number of employees dropped by 11.62%, while the most affected region was Macro 4 (i.e. the *South-West Oltenia* development), where 15.3% of employees lost their jobs. Likewise, it should be emphasized that in the case of Macro 2 the impact of the economic crisis on the number of employees lasted until 2011.

Although Romania's economy recovered somewhat after 2010, the increase in the number of employees has been slow, both at national level in Romania and also at the level of the macro regions. In Romania, the annual average gain in the number of employees, from 2011 to 2012, was 22.67 thousand persons; the highest rise was recorded in Macro 1 (15.67 thousand persons annually) and the lowest in Macro 3 (2.33 thousand persons annually). The rises recorded in the post-crisis period (i.e. until late 2013) were not sufficient to reach the level recorded in the pre-crisis period. The total national number of employees in Romania for 2013 represented 88.07% of the number recorded in 2008.

At the level of the macro regions, the number of employees recorded in 2013, in relation to those recorded in 2008, was: 91.09% in Macro 1(North-West and Center development regions); 84.28% in Macro 2; 88.81% in Macro 3, and 87.47% in Macro 4.

3.2. The significance of specificity on the evolution of the number of employees in the macro regions

The evolution of the average number of employees in Romania's four macro regions seems to be similarly affected by the economic crisis that started in late 2008; this has been examined above and shown in Fig. 1. The hypothesis was set up to test the influence of specific factors such as culture, habits, traditions, the dominant religion and applied restructuring policies on each macro-region, and how this changed the average number of employees. There were four data sets generated which contained indices that show the evolution of the number of employees from 2003 (the first year of the period analyzed). Each series is a group corresponding to a macro-region.

Starting from these four groups, ANOVA method was applied with a significance level $\alpha = 0.05$. The hypotheses tested are:

- H_0: The factors specific to Romania's macro regions do not significantly influence the evolution of the average number of employees
- H_1: The factors specific to Romania's macro regions have a significant influence on the evolution of the average number of employees

The results obtained are shown in Table 2.

Source of Variation	*Sum of Square*	*Degrees of Freedom*	*Mean Square*	*F*	*P-value*	*F critic*
Between Groups	796.5229	3	265.50760	8.502963	0.000172	2.838745
Within Groups	1249.012	40	31.22531			
Total	2045.535	43				

Table 2. ANOVA table for testing the hypothesis that the factors specific to Romania's macro regions do not significantly influence the evolution of the average number of employees. Source: Authors' data processing.

In order to test the null hypothesis, the test F one-tail is applied, and that F = 8.502963 > F_critc = 2.838745, it follows that the null hypothesis is rejected and the alternative hypothesis must be accepted. The same conclusion is also reached taking into account P_value, which is much lower than the level of significance ($\alpha = 0.05$). As a result, the factors specific to Romania's macro regions have a significant influence on the evolution of the average number of employees.

3.3. Analysis on the evolution of the average number of employees in the counties of the South-West Oltenia region in the period 2003-2013

As seen above, although Macro 4 ranks last in terms of the number of employees throughout the analysed period (Fig. 1), the fact remains that the number of employees increased here by 19 thousand people in 2013 when compared to the minimal values determined by the economic crisis. Macro 4 ranks second in terms of growth before Macro 3, where the rise was 7 thousand people, and before Macro 2, where the rise was 16 thousand.

In order to better compare the effect of the economic-crisis on the number of employees in the *South-West Oltenia* region, the indices of the average number of employees were determined and used both at the Macro 4 level and at the level of the development regions, as well as at the county level.

The changes in the average number of employees in Macro 4 and in the *West* and *South-West Oltenia* development regions are presented in Fig. 2. In the pre-crisis period (until and including 2007), the indices show that the evolution of the average number of employees in Macro 4 is identical to the evolution recorded at the national level in Romania.

In 2008 (the year preceding the outbreak of the economic crisis), the indices of the average number of employees in Macro 4 dropped by 1.9 percentage points; this can be explained by the lower intensity of the rise in the number of employees in both the *West* and in *South-West Oltenia* development regions,. It is worth noting that while in the *West* development region, the annual average number of employees was 11.5% higher than in 2003, in *South West-Oltenia* development region, the inscrease was only 3.9%.

The economic crisis of late 2008 caused the average number of employees to collapse in the *West* region by 15.5 percentage points and in *South-West Oltenia* region by 14.7 percentage points. Although Romania's economy has

been growing since 2011, a rise in the total number of workplaces is practically non-existent, especially in *South-West Oltenia*.

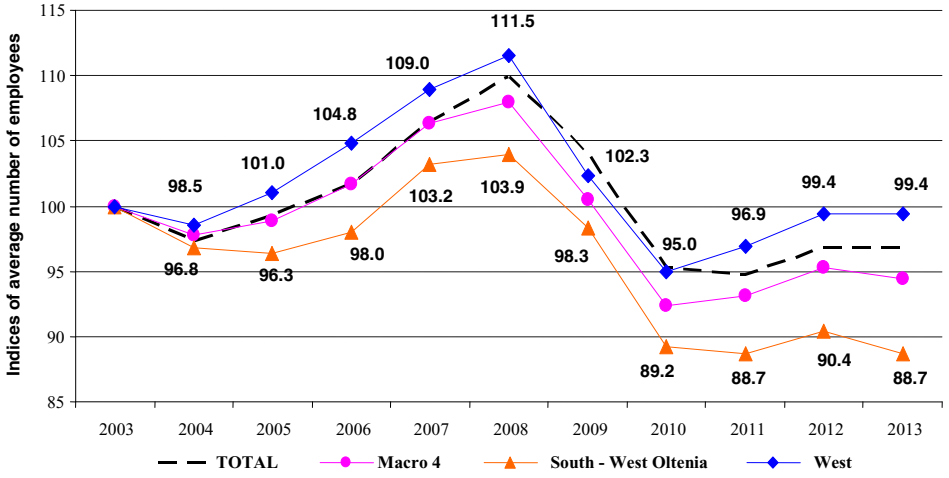

Fig. 2. The evolution of the average number of employees in Macro 4 and in *West* and *South-West Oltenia* development regions. 2003=100. Source: Authors' data processing, based on NIS data base.

The impact of the global crisis on the economy of Macro 4 (especially in the *South-West Oltenia* development region) was so strong that in 2013 this region had the lowest number of employees throughout the analysed period, representing only 88.7% of the total employees recorded in 2003, and only 85.37% as compared to 2008.

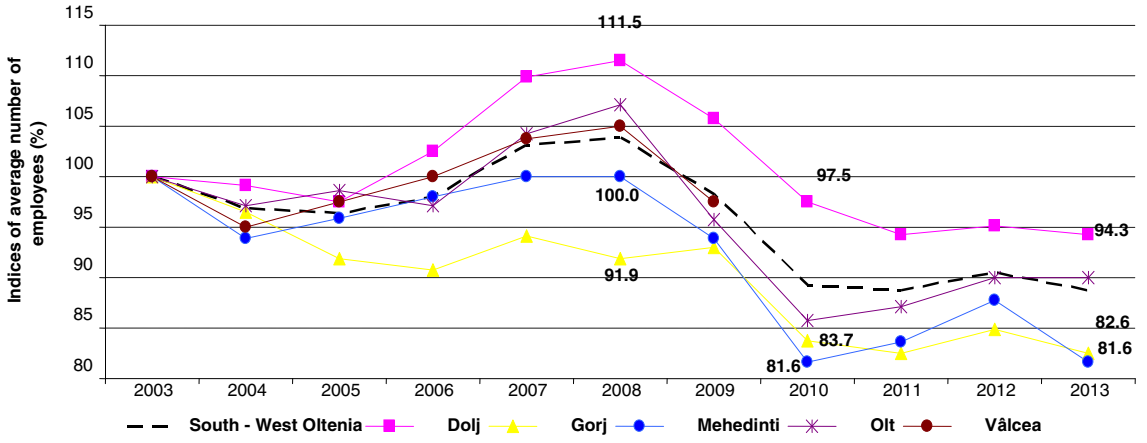

Fig. 3. Changes in the average number of employees in *South-West Oltenia* development region by county. Source: Authors' data processing, based on the NIS database.

At the county level in the *South-West Oltenia* development region, the indices of the average number of employees (Fig. 3) follow relatively different trajectories. In Gorj, Olt and Vâlcea counties, the period preceding the economic crisis favoured growth in the number of employees, by 11.5% in Dolj, 4.3% in Olt and 3.7% in Vâlcea. On the other hand, Mehedinţi county saw a reduction of employees by 6.1 percentage points in 2004, and the level attained in 2003 was barely reached. In Gorj county, the number of employees only represented 91.9% of the value recorded in 2003.

3.4. The influence of factors specific to counties in South-West Oltenia on the evolution of the number of civil employees is significant

In order to test the influence exerted by the specific conditions in each county of the *South-West Oltenia* region on the evolution of the number of employees in those counties, five data sets were generated to contain evolution indices of the average number of employees in each county from 2003 onwards. Each series is a group corresponding to a county containing a series of 11 values for each of the 11 years in the analysed period. Starting from these five groups, ANOVA method was applied, with a significance level $\alpha = 0.05$.

The tested hypotheses are:

- H_0: The factors specific to the counties of *South-West Oltenia* region do not significantly influence the average number of employees
- H_1: The factors specific to the counties of *South-West Oltenia* region have a significant influence on the average number of employees

The results are shown in Table 3.

Source of Variation	*Sum of Square*	*Degrees of Freedom*	*Mean Square*	*F*	*P-value*	*F critic*
Between Groups	715.740	4	178.9351	4.41214	0.003928	2.557179
Within Groups	2027.759	50	40.55517			
Total	2743.499	54				

Table 3. ANOVA table for testing the hypothesis: The factors specific to the counties of *South-West Oltenia* region do not significantly influence the evolutions of the average number of employees. Source: Authors' data processing

Considering that F = 4.41214 > F_critc = 2.557179, it follows that the null hypothesis is rejected and the alternative hypothesis is accepted. Also the $P\_value = 0.003928 < \alpha = 0.05$. Consequently, the specific factors of the counties of *South-West Oltenia* region have a significant influence on the evolution of the average number of employees.

Although the economic crisis influenced the number of civil employees in all five counties of *South-West Oltenia* region, the specific economic and social factors have had a decisive influence on the evolution of the number of civil employees in each county. This means that local policies and decisions have the highest importance to improve the situation.

3.5. Changes in the structure of civil employment by national-economy activities in the South-West Oltenia region

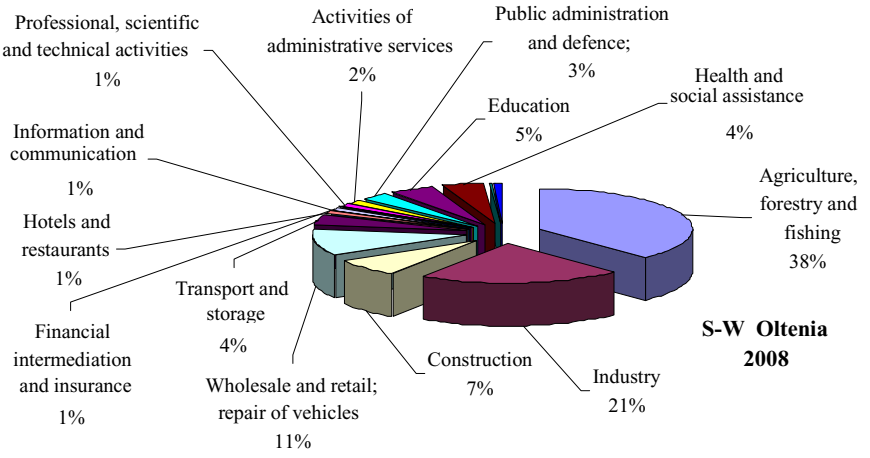

Fig. 4. The structure of civil employment by national-economy activities in South-West Oltenia region in 2008. Source: Authors' data processing

The economic crisis of 2008 and specific local factors have influenced the evolution of the number of employees in Romania's macro regions, development regions and counties, as highlighted above. The processes, phenomena and policies applied at both the central and local level brought changes in the distribution of civil employment.

In 2008, in the *South-West Oltenia* development region, most of the active civil population (38%) worked in agriculture, forestry and fishing; the second position (Fig. 4) was occupied by industry (21%). At the level of Macro 4 (which includes *West* and *South-West Oltenia*) the share of the active civil population who worked in agriculture was 31%; and in industry, 25%.

Significant shares of the active civil population worked in wholesale and retail: repair of motor vehicles and motorcycles (11%); civil engineering (7%); and transport and storage (4%). With respect to employment in activities of provided services, greater shares were in education (5%), health and social assistance (4%), public administration and defence (3%), social insurance of public sector (3%), Hotels and restaurants (2%) and administrative services and support services (2%).

County	*Agriculture, forestry and fishing*	*Industry*	*Civil engineering*	*Wholesale and retail; repair of motor*	*Transport and storage*	*Education*	*Health and social assistance*
Dolj	39	18	7	14	4	5	5
Gorj	28	28	10	9	4	5	5
Mehedinți	43	19	7	8	4	4	4
Olt	45	22	6	7	3	4	4
Vâlcea	33	23	8	13	4	4	4

Table 4. The distribution of civil employment by the national-economy activities, with significant shares in the counties of South-West Oltenia region from 2008. Source: Authors' data processing

The distribution of civil-employment by national-economy activities is presented at the county level in Table 4. Significant differences are conspicuous in Gorj County, where the share of the employed population in agriculture was only 28%, much lower than in the other counties, as well as in industry (28%) and civil-engineering (10%) where the percentage of civil engineering is significantly greater. Likewise, in Dolj County, an important share of the employed civil population works in wholesale and retail, particularly the repair of motor vehicles and motorcycles (14%).

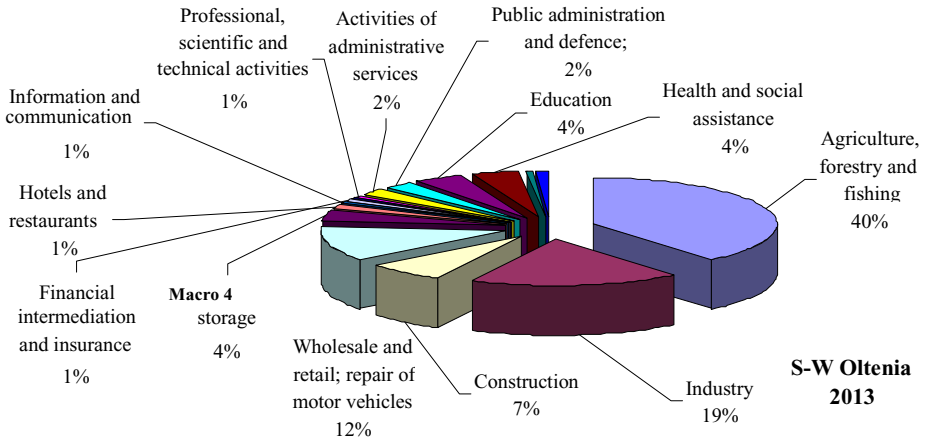

Fig. 5. The structure of civil employment by national-economy activities in South-West Oltenia in 2013. Source: Authors' data processing

In 2013, in the *South-West Oltenia* development region, the share of the active civil population working in agriculture, forestry and fishing, increased from 38% to 40%, whereas the share of the people working in industry decreased from 21% to 19%. This negative effect is a consequence of the processes and phenomena having taken place in the period 2008 – 2013 (Fig.5).

Likewise, several changes occurred in the activity of wholesale and retail; the civil population employed in the repair of motor vehicles and motorcycles increased from 11% to 12%.On the contrary, in education and public administration and defence, social insurance of public sector, reductions of one percentage point were recorded in all these sectors.

At the county level, the distribution of the civil employment by the national-economy activities is presented in Table 5 with data from 2013. The most affected sector, in terms of its share of civil employment, was industry. In the period 2008-2013, that share fell by 4 percentage points in Gorj (from 19% to 15%), by 3 percentage points in Dolj, Gorj and Olt, and by 2 percentage points in Vâlcea. Except for the Gorj County, in which the civil employment, laid off industry, passed in civil engineering and wholesale and retail, repair of motor vehicles and motorcycles; in other counties, the civil employment moved towards agriculture.

County	*Agriculture, forestry and fishing*	*Industry*	*Constructions*	*Wholesale and retail; repair of motor*	*Transport and storage*	*Education*	*Health and social assistance*
Dolj	40	15	6	13	4	5	5
Gorj	28	25	11	11	4	5	4
Mehedinţi	45	15	8	11	4	4	4
Olt	47	19	5	9	3	4	4
Vâlcea	34	21	7	15	5	4	4

Table 5. The distribution of civil employment by national-economy activities, with significant shares in the counties of *South-West Oltenia* in 2013. Source: Authors' data processing

In order to test whether the economic crisis produced significant changes in the distribution of civil employment by the national-economy, four activities were selected: agriculture, forestry and fishing; industry; construction; and finally, wholesale and retail, repair of motor vehicles and motorcycles**.** The tested hypotheses are:

- H_0: The average share of civil employment in economic activities in 2013 does not significantly differ from the average recorded in 2008;
- H_1: The average share of civil employment in economic activities in 2013 significantly differs from the average recorded in 2008.

The null hypothesis (H_0) was tested using t-Test: Two Sample Assuming Unequal Variance, for the significance level $\alpha = 0.05$. The results are shown in Table 6.

For all four examined cases, the critical value is $t\_Critical = t_{0.025;8} = 2.306$, and the critical region (i.e. a region which rejects the null hypothesis) is $(-\infty,-2.306)\cup(2.306,+\infty)$. Considering that none of the values t Stat is in the critical region, it follows that, for the four analysed economic activities, the null hypothesis is accepted. Consequently, in 2013 the average share of the civil employment in each of the four economic activities in *South-West Oltenia* region does not significantly differ from the average recorded by those activities before the onset of the economic crisis.

County	*Mean 2008*	*Mean 2013*	*Variance 2008*	*Variance 2013*	*t Stat*	*t Critical two-tail*	*Accepted*
Agriculture, forestry and fishing	37.6	38.8	49.8	61.7	-0.2541	2.306	H_0
Industry	22.0	19.0	15.5	18.0	1.1590	2.306	H_0
Construction	7.6	7.5	2.3	6.3	0.1107	2.306	H_0
Wholesale and retail; repair of motor vehicles and motorcycles	10.2	11.9	9.7	4.9	-1.0071	2.306	H_0

Table 6. The results of t-Test: Two-Sample Assuming Unequal Variances, for the national economy-activities in *South-West Oltenia* development region, before and after the global crisis. Source: Authors' data processing

4. Conclusions

The economic crisis of late 2008 had a negative impact on the employed population from at least two perspectives; job losses and, implicitly, deterioration of living standards. This fact interrupted the process of economic growth, a characteristic of the previous period; by 2010, the average number of employees decreased by approximately 8.7 percentage points at the national level in Romania. The most affected region was Macro 2, where in 2010 the average number of employees represented only 86.1% of the value recorded in 2003.

The same effects of the economic crisis were also recorded in the *South-West Oltenia* development region and at the level of its counties. Although in the post-crisis period, several growth processes were recorded by 2013 (with the exception of Vâlcea County), in the other counties, the share of the employed civil population was below the values recorded in 2003 by at least 10 percentage points.

In 2013, in *South-West Oltenia*, the share of the active civil population who worked in agriculture, forestry and fishing increased from 38% to 40%, whereas the share of the people working in industry decreased from 21% to 19%, a consequence of the processes and phenomena that occurred in the period 2008 – 2013.

The most important conclusion is the fact that the decreasing number of employed is, first of all, the consequence of the specific factors, processes, as well as of the central and regional decisions in these areas. The economic crisis intensified the decreasing average number of employees, especially in the industrial branches. Consequently, overcoming the economic crisis only partially resolves the problem of the workplaces.

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